BRUSHHEAD STEM WITH CORE CHANNELS FOR DISPENSING FLUIDS

Technical Field

This invention relates generally to fluid-dispensing toothbrushes, and more specifically concerns a stem portion of a toothbrush with fluid channels extending therethrough.

Background of the Invention

Fluid-dispensing toothbrushes typically include a tube or tubes or other fluid pathway which extend between a fluid reservoir, usually located in the handle of the toothbrush, to a brush plate which supports a field of bristles, where the fluid exits. The fluid-carrying tubes typically extend from the reservoir through a toothbrush stem portion of the toothbrush to the brush plate.

In many cases, the toothbrush stem will be molded as one piece and will include a channel extending longitudinally therethrough to accommodate the fluid flow, such as by a tube. In some cases, it is desirable to have more than one channel through the stem, such as when two fluids are to be delivered to the bristles and the fluids are not compatible if mixed together. In such a case, manufacturing requirements for the stem mold results in the stem being fairly large in diameter, bulky and unattractive.

It would be desirable to have a toothbrush stem which accommodates more than one fluid channel, while being relatively slim and attractive.

Summary of the Invention

Accordingly, the present invention is a stem portion for a toothbrush for delivering fluid supplied from at least one reservoir to at least one exit opening in a bristle plate with bristles, comprising: a stem body having an interior longitudinal opening; and a core member configured to fit within the stem body opening, wherein the stem body and/or the core member have at least one groove extending therealong, wherein said at least one groove receives fluid at one end of the stem portion and delivers fluid to the bristle plate opening.

Brief Description of the Drawings

Figure 1 is a perspective view of a power toothbrush which includes the toothbrush stem of the present invention.

Figure 2 is an exploded view of one embodiment of the toothbrush stem of the present invention.

Figure 3 is a cross-sectional view of the toothbrush stem of Figure 2 taken along lines A-A of Figure 2.

Figure 4 is a cross-sectional view of the toothbrush stem of Figure 2 taken along lines B-B of Figure 2.

Figure 5 is a view of a second embodiment of the toothbrush stem of the present invention, showing the back of the toothbrush stem and adjoining bristle plate.

Best Mode for Carrying Out the Invention

Figures 1 and 2 show the toothbrush stem of the present invention in a toothbrush 10. The toothbrush stem, shown generally at 11, terminates in a brush plate 12 from which toothbrush bristles extend, forming a bristle field 14 for the toothbrush. Brush plate 12 can either be in the form of a continuous extension of stem 11 as shown in Figure 1, or it can be a separate piece which is attached to the forward end of the stem. The rear, *i.e.* distal, end 16 of stem 11 connects to a head portion 18 of a toothbrush, which in turn is connected, usually removably, to a handle portion 20.

The particular arrangement and configuration of the head portion 18 and the handle portion 20 of a toothbrush are shown for convenience and illustration, and it should be understood that those portions of the toothbrush can take many different arrangements and configurations relative to the toothbrush stem 11.

The toothbrush stem 11 includes a shell portion or stem body 24 and a core portion 26. The shell portion 24 is hollow and adapted to receive core portion 26 therein. Both the shell portion and the core portion are typically made from plastic, although other materials can be used. The hollow opening 27 in shell portion 24, which extends longitudinally through the shell, is generally circular in cross-section, with two semi-circular grooves 28 and 30 in the interior surface 31 thereof which extend for the length of the shell 24, as shown in Figure 2. Typically, grooves 28 and 30 oppose each other, spaced apart by 180°, although different angular placements are possible.

Core portion 26 is also generally circular in cross-section except for two semi-circular grooves 32 and 34 in the outer surface 35 of the core portion. Grooves 28, 30, 32 and 34 are arranged and spaced in the embodiment shown so that grooves 28 and 30 align with grooves 32 and 34 to define approximately circular channels which extend the length of the stem. In alternative arrangements, the grooves in the shell portion or the core portion could be eliminated, leaving a groove or grooves in one portion only, or there could

be one groove in the shell portion and another non-aligned groove in the core portion. Further, there could be only one pair of aligned grooves or more than two. Further, the grooves could be other cross-sectional shapes than semi-circular, *e.g.* elliptical, half-square, etc.

In the embodiment shown, the core portion has an outside diameter of approximately 4 mm, with a 1/2 mm semi-circular groove in the outer surface thereof. The internal diameter of the shell 24 is slightly greater than 4 mm, allowing the core to fit conveniently into the shell. The grooves in the internal surface of the core also have an approximately 1/2 mm radius. These dimensions, however, can change depending upon the particular application. In the embodiment shown, the outside diameter of the shell will vary slightly, to give a tapered, attractive appearance, from approximately 7 mm at the distal end to 6 mm at the brush end. These dimensions, however, can also be varied.

Shell portion 24 will also typically include two opposed small key slots 38 and 40 in the interior surface 31 thereof. Key slots 38 and 40 will generally oppose each other, extending substantially the length of the shell, and will usually be positioned at 90° relative to grooves 28 and 30 in the shell portion.

The core portion 26 has mating rib elements 42 and 44 which extend outwardly from the exterior surface 15 thereof. Rib elements 42 and 44 are configured and arranged to fit within key slots 38 and 40. The ribs 42 and 44 are crushable to form a fluid-tight barrier between the opposing sets of mating grooves/ribs. Welding can also be used to form a fluid-tight barrier, in which case slots 38 and 40 are not necessary.

This arrangement permits two paths for fluids through the stem 11 of the toothbrush. At the brushhead end of stem 11, the two channels can be extended through the bristle plate 12 to selected exit points 47, 49 in the bristle plate. The fluid pathways 51, 53 through the bristle plate are typically molded into the bristle plate 12. They can, however, be in the form of small tubes in a hollow bristle plate.

At the distal end of core portion 26 is a coupling member 48 which is slightly larger than the external diameter of the core portion. For instance, for a core portion having an outside diameter of 4 mm, the outside diameter of coupling member 48 can be approximately 5 mm. Coupling member 48 includes grooves 50 and 52 which mate with the sets of grooves in the shell and core portions. Coupling member 48 is adapted to form a fluid-tight barrier with a mating surface of shell 24, either by a friction fit or other means.

Grooves 50 and 52 are adapted to receive the ends of fluid tubes 54 and 56 which extend from fluid reservoir(s) in another part of the toothbrush, such as handle 20. There could be separate reservoirs for the two channels, or a single reservoir. Tubes 54 and 56 snap into place in the coupling member before the entire core portion 26 is positioned within shell 24. Adhesive or other means is used to ensure a fluid-tight coupling between tubes 54 and 56 and coupling member 48.

In operation, fluids are pumped from the reservoir(s) through tubes 54 and 56 into the channels in stem 11 formed by the semi-circular grooves 28 and 30 in the shell portion and aligned grooves 32 and 34 in the core portion.

The above arrangement provides a multi-channel capability in the toothbrush stem for fluid dispensing while maintaining the stem relatively slim and attractive during the molding process. While the embodiment shown includes two fluid channels in stem 11, it should be understood that the principles of the present invention extend to an arrangement as indicated above with only a single channel and, further, more than two channels, depending on the particular application/requirement.

Figure 5 shows a back view of another embodiment of a stem 57 of the present invention. This embodiment includes a lower longitudinal half portion 58 and an upper longitudinal half portion 60 which are secured together. The internal surfaces of the two portions 58 and 60 are configured to form two separate channels when secured together. The channels 62, 64 begin at an entry point at the distal end 67 of the stem, which includes hollow entry members 63 and 65. The two channels basically are arranged side-by-side, angling somewhat toward each other as the outside diameter of stem 57 decreases along its length. The entry members 63 and 65 connect with the channels 62, 64. The channels defined in this embodiment are more irregular in configuration than the channels in the embodiment of Figure 1. One channel 62 extends along the stem to a first exit opening 68 in bristle plate 69.

Typically, a valve, such as a duckbill valve (not shown), is positioned in said opening. Fluid then moves through channel 62 through opening 68 in the bristle plate and the valve into the bristle field. The other channel 64 extends generally along the opposite side of the stem in the same horizontal plane and includes a channel portion which extends beyond exit opening 68 for the first channel to a second exit opening 70 spaced apart from

opening 68, toward the other end of the bristle plate 69. Again, in this embodiment, a single channel could be provided through the stem or more than two channels.

Although a preferred embodiment of the invention has been disclosed for purposes of illustration, it should be understood that various changes, modifications and substitutions may be incorporated without departing from the spirit of the invention, which is defined by the claims which follow.